



Post Office Box 2000, Decatur, Alabama 35609-2000

March 27, 2023

10 CFR 50.73  
10 CFR 50.4(a)

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Browns Ferry Nuclear Plant, Unit 1  
Renewed Facility Operating License No. DPR-33  
NRC Docket No. 50-259

Subject: **Licensee Event Report 50-259/2023-001-00 – High Pressure Coolant Injection System Inoperable Due to a Torn Valve Diaphragm**

Reference: Non-Emergency Event Notification 56321 – High Pressure Coolant Injection Inoperable

The enclosed Licensee Event Report provides details of a failed diaphragm which resulted in the inoperability of the High Pressure Coolant Injection system. The Tennessee Valley Authority (TVA) is submitting this report in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.73(a)(2)(v)(D), as any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

There will be a supplement to this Licensee Event Report to provide additional time to complete the apparent cause evaluation.

There are no new regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Chris L. Vaughn, Site Licensing Manager, at (256) 729-2636.

Respectfully,

A handwritten signature in black ink, appearing to read "Manu Sivaraman", is written over a light blue horizontal line.

Manu Sivaraman  
Site Vice President

U.S. Nuclear Regulatory Commission

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March 27, 2023

Enclosure: Licensee Event Report 50-259/2023-001-00 – High Pressure Coolant Injection  
System Inoperable Due to a Torn Valve Diaphragm

cc (w/ Enclosure):

NRC Regional Administrator - Region II

NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

NRC Project Manager - Browns Ferry Nuclear Plant



## LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)  
(See NUREG-1022, R.3 for instruction and guidance for completing this form  
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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## 1. Facility Name

Browns Ferry Nuclear Plant, Unit 1

☒ 050  
☐ 052

## 2. Docket Number

000259

## 3. Page

1 OF 5

## 4. Title

High Pressure Coolant Injection System Inoperable Due to a Torn Valve Diaphragm

## 5. Event Date

Month	Day	Year
01	24	2023

## 6. LER Number

Year	Sequential Number	Revision No.
2023	001	00

## 7. Report Date

Month	Day	Year
03	27	2023

## 8. Other Facilities Involved

Facility Name	<input type="checkbox"/> 050	Docket Number
N/A		N/A
Facility Name	<input type="checkbox"/> 052	Docket Number
N/A		N/A

## 9. Operating Mode

1

## 10. Power Level

100

## 11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

10 CFR Part 20	<input type="checkbox"/> 20.2203(a)(2)(vi)	10 CFR Part 50	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 73.1200(a)
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 73.1200(b)
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 73.1200(c)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 73.1200(d)
<input type="checkbox"/> 20.2203(a)(2)(i)	10 CFR Part 21	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	10 CFR Part 73	<input type="checkbox"/> 73.1200(e)
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 21.2(c)	<input type="checkbox"/> 50.69(g)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.77(a)(1)	<input type="checkbox"/> 73.1200(f)
<input type="checkbox"/> 20.2203(a)(2)(iii)		<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(2)(i)	<input type="checkbox"/> 73.1200(g)
<input type="checkbox"/> 20.2203(a)(2)(iv)		<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(ii)	<input type="checkbox"/> 73.1200(h)
<input type="checkbox"/> 20.2203(a)(2)(v)		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)		

☐ OTHER (Specify here, in abstract, or NRC 366A).

## 12. Licensee Contact for this LER

## Licensee Contact

Ryan Coons, Licensing Engineer

## Phone Number (Include area code)

256-729-2070

## 13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to IRIS	Cause	System	Component	Manufacturer	Reportable to IRIS
B	BJ	FCV	C665	Y	N/A	N/A	N/A	N/A	N/A

## 14. Supplemental Report Expected

☐ No ☒ Yes (If yes, complete 15. Expected Submission Date)

## 15. Expected Submission Date

Month	Day	Year
05	26	2023

## 16. Abstract (Limit to 1326 spaces, i.e., approximately 13 single-spaced typewritten lines)

On January 24, 2023 at 0121 CST, the Browns Ferry Nuclear Plant, Unit 1, High Pressure Coolant Injection (HPCI) was declared inoperable because the normally-open HPCI Steam Line Condensate Outboard Drain Valve failed closed, apparently due to a failed diaphragm. On January 24, 2022, at 0743 CST, eight-hour Event Notification 56321 was made to the NRC.

The Tennessee Valley Authority (TVA) is submitting this report in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.73(a)(2)(v)(D), as any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

The causal analysis and corrective actions will be reported later in a supplement to this LER.

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

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<b>1. FACILITY NAME</b>  Browns Ferry Nuclear Plant, Unit 1	<input checked="checked" type="checkbox"/> <b>050</b>	<b>2. DOCKET NUMBER</b>  00259	<b>3. LER NUMBER</b>		
	<input type="checkbox"/> <b>052</b>		<b>YEAR</b> 2023	<b>SEQUENTIAL NUMBER</b> - 001	<b>REV NO.</b> - 00

**NARRATIVE****I. Plant Operating Conditions before the Event**

At the time of discovery, Browns Ferry Nuclear Plant (BFN) Unit 1 was in Mode 1 at approximately 100 percent power.

**II. Description of Event****A. Event Summary**

On January 24, 2023 at 0121 CST, the BFN, Unit 1, High Pressure Coolant Injection (HPCI) was declared inoperable because the normally-open HPCI Steam Line Condensate Outboard Drain Valve (1-FCV-073-0006B) [FCV] failed closed, apparently due to a failed diaphragm. On January 24, 2022, at 0743 CST, eight-hour Event Notification (EN) 56321 was made to the NRC.

The Tennessee Valley Authority (TVA) is submitting this report in accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.73(a)(2)(v)(D), as any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

**B. Status of structures, components, or systems that were inoperable at the start of the event and that contributed to the event**

There were no structures, systems, or components (SSCs) whose inoperability contributed to this event.

**C. Dates and approximate times of occurrences**

Dates and Approximate Times	Occurrence
January 24, 2023, 0121 CST	BFN, Unit 1, HPCI is declared inoperable when the HPCI Steam Line Condensate Outboard Drain Valve failed closed.
January 25, 2023, 0215 CST	BFN, Unit 1, HPCI is declared operable following the satisfactory completion of repair work and its associated post-maintenance testing (PMT).

**D. Manufacturer and model number of each component that failed during the event**

The failed component was a Crane Company flow control valve, part number AO-498-S1-1.

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YEAR	SEQUENTIAL NUMBER	REV NO.					
2023	- 001	- 00					

**NARRATIVE****E. Other systems or secondary functions affected**

No other systems or secondary functions were affected.

**F. Method of discovery of each component or system failure or procedural error**

The failure of the normally-open HPCI Steam Line Condensate Outboard Drain Valve was discovered when the valve suddenly closed.

**G. The failure mode, mechanism, and effect of each failed component**

The causal analysis will be reported later in a supplement to this LER.

**H. Operator actions**

There were no operator actions associated with this event.

**I. Automatically and manually initiated safety system responses**

There were no automatic or manual safety system responses associated with this event.

**III. Cause of the event****A. Cause of each component or system failure or personnel error**

The causal analysis will be reported later in a supplement to this LER.

**B. Cause(s) and circumstances for each human performance related root cause**

The causal analysis will be reported later in a supplement to this LER.

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**NARRATIVE****IV. Analysis of the event**

The HPCI system is provided to assure that the reactor is adequately cooled to limit fuel cladding temperature in the event of a small break in the nuclear steam supply system and loss of coolant which does not result in rapid depressurization of the reactor vessel. The HPCI system permits the nuclear plant to be shut down, while maintaining sufficient reactor vessel water inventory until the reactor vessel is depressurized. The HPCI system continues to operate until the reactor vessel pressure is below the pressure at which low pressure coolant injection (LPCI) [BO] operation or core spray system [BM] operation maintains core cooling. Due to the HPCI system's inoperability, it would have been unable to perform its safety function.

Additional analysis of this event will be reported later in a supplement to this LER.

**V. Assessment of Safety Consequences**

This event resulted in inoperability and unavailability of the single train of the BFN, Unit 1, HPCI system resulting in the inability of the HPCI system to perform its safety function to mitigate the consequences of an accident. In the event of an emergency, the RCIC system remained operable, and all Automatic Depressurization Systems (ADS) were available during this event to facilitate core cooling by low pressure Emergency Core Cooling Systems (ECCS). Additionally, BFN has an installed diesel-backed Emergency High Pressure Makeup Pump (EHPMP) that operators can utilize to inject high pressure water to the reactor vessel per 1-EOI-1 as needed when HPCI is unavailable. Based on the above, during the time period that the HPCI system was inoperable, sufficient systems were available to provide the required safety functions to protect the health and safety of the public. There was no significant reduction to the health and safety of the public or plant personnel for this event.

**A. Availability of systems or components that could have performed the same function as the components and systems that failed during the event**

During this event, RCIC was verified to be operable by Operations personnel. Additionally, all other ECCS and ADS systems remained operable for the duration of the event.

**B. For events that occurred when the reactor was shut down, availability of systems or components needed to shutdown the reactor and maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident**

This event did not occur when the reactor was shutdown.

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**NARRATIVE****C. For failure that rendered a train of a safety system inoperable, estimate of the elapsed time from discovery of the failure until the train was returned to service**

HPCI was inoperable from the time of discovery on January 24, 2023, 0121 CST until the diaphragm was replaced and its associated PMT was completed on January 25, 2023, 0215 CST. The BFN, Unit 1, HPCI system was inoperable for approximately one (1) day.

**VI. Corrective Actions**

Corrective Actions are being managed by the TVA's corrective action program under Condition Report (CR) 1830955.

**A. Immediate Corrective Actions**

The diaphragm was replaced under WO 123430246.

**B. Corrective Actions to Prevent Recurrence or to reduce the probability of similar events occurring in the future**

The corrective actions will be reported later in a supplement to this LER.

**VII. Previous Similar Events at the Same Site**

A search of LERs from BFN, Units 1, 2, and 3 over the last five years identified no similar events.

**VIII. Additional Information**

There is no additional information.

**IX. Commitments**

There are no new commitments.